

Appl. No. 10/811,780
Amdt. dated March 1, 2006
Reply to Office Action of December 23, 2005

Atty. Ref. 81754.0127
Customer No. 26021

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently amended) An electronic circuit for a contactless tag, comprising:
a transceiving device having an antenna coil; and
means for switching between a state where the antenna coil forms a resonance circuit of the transceiving device and a state where the antenna coil forms a booster circuit,

wherein the means for switching includes a changeover switch having a first connection terminal for connection of the transceiving device to the resonance circuit and a second connection terminal for connection of the transceiving device to the booster circuit.

2. (Original) The electronic circuit for a contactless tag according to claim 1, wherein the means for switching switches between the two states based on an electromotive force induced by the antenna coil due to electromagnetic induction.

3. (Currently amended) The electronic circuit for a contactless tag according to claim 1, wherein the ~~means for switching is a changeover switch having a first~~ connection terminal for the resonance circuit and a the second connection terminal for the booster circuit, ~~which~~ are sequentially connected to the antenna coil according to a circuit changeover control signal, and the electronic circuit further comprises:

means for rectifying the electromotive force via the first connection terminal to generate a rectified voltage;

first and second capacitors connected in parallel to the means for rectifying for storing the rectified voltage;

a battery connected to the second connection terminal;

means for generating the circuit changeover control signal and a switching driving signal based on the rectified voltage; and

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a charge pump that is turned on and off according to the switching driving signal when the booster circuit is formed according to the circuit changeover control signal, and that causes a first current that is conducted through the antenna coil from the battery to flow so as to store a charge in the antenna coil during an ON time, while supplying a boosted voltage based on a counter electromotive force generated in the antenna coil to the second capacitor so as to cause a second current to flow to the second capacitor from the antenna coil during an OFF time.

4. (Currently amended) The electronic circuit for a contactless tag according to claim 1, wherein the ~~means for switching is a changeover switch having a~~ first connection terminal for the resonance circuit and a the second connection terminal for the booster circuit, ~~which~~ are sequentially connected to the antenna coil according to a circuit changeover control signal, and the electronic circuit further comprises:

means for rectifying the electromotive force via the first connection terminal to generate a rectified voltage;

first and second capacitors connected in parallel to the means for rectifying for storing the rectified voltage;

a battery connected in parallel to the means for rectifying;

means for generating the circuit changeover control signal and a switching driving signal based on the rectified voltage; and

a charge pump that is turned on and off according to the switching driving signal when the booster circuit is formed according to the circuit changeover control signal, and that causes a first current that is conducted through the antenna coil from the battery to flow so as to store a charge in the antenna coil during an ON time, while supplying a boosted voltage based on a counter electromotive force generated in the antenna coil to the second capacitor so as to cause a second current to flow to the second capacitor from the antenna coil during an OFF time.

5. (Original) The electronic circuit for a contactless tag according to claim 3, further comprising a means for detecting the rectified voltage, wherein the battery

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is connected to the second connection terminal via the means for generating according to the detected rectified voltage.

6. (Original) The electronic circuit for a contactless tag according to claim 4, wherein the battery is chargeable, and the electronic circuit further comprises a means for detecting a voltage of the battery, wherein the circuit changeover control signal is generated based on the detected voltage of the battery.

7. (Original) The electronic circuit for a contactless tag according to claim 6, wherein the means for generating comprises:

an antenna changeover circuit that generates the circuit changeover control signal based on the rectified voltage or the voltage of the battery; and

a field-effect transistor (FET) control circuit that generates a switching gate signal having a duty ratio corresponding to a predetermined ratio of an ON-OFF operation according to the circuit changeover control signal.

8. (Original) A contactless tag using the electronic circuit for a contactless tag according to claim 1.

9. (Original) The electronic circuit for a contactless tag according to claim 1, wherein the transceiving device is brought into close proximity to a reader/writer for data communication.

10. (Original) The electronic circuit for a contactless tag according to claim 9, wherein the antenna coil resonates according to a power supplied from the reader/writer when it is brought into close proximity to the reader/writer.

11. (Currently amended) An electronic circuit for a contactless tag, comprising:

a transceiving device having an antenna coil; and

a circuit changeover switch that switching between a state where the antenna coil forms a resonance circuit of the transceiving device and a state where the antenna coil forms a booster circuit.

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wherein the circuit changeover switch includes a first connection terminal for connection of the transceiving device to the resonance circuit and a second connection terminal for connection of the transceiving device to the booster circuit.

12. (Original) The electronic circuit for a contactless tag according to claim 11, wherein the circuit changeover switch switches between the two states based on an electromotive force induced by the antenna coil due to electromagnetic induction.

13. (Currently amended) The electronic circuit for a contactless tag according to claim 11, wherein the ~~circuit changeover switch has a~~ first connection terminal for the resonance circuit and a the second connection terminal for the booster circuit, ~~which~~ are sequentially connected to the antenna coil according to a circuit changeover control signal, and the electronic circuit further comprises:

a rectification circuit that rectifies the electromotive force via the first connection terminal to generate a rectified voltage;

first and second capacitors connected in parallel to the rectification circuit for storing the rectified voltage;

a battery connected to the second connection terminal;

a control circuit that generates the circuit changeover control signal and a switching driving signal based on the rectified voltage; and

a charge pump that is turned on and off according to the switching driving signal when the booster circuit is formed according to the circuit changeover control signal, and that causes a first current that is conducted through the antenna coil from the battery to flow so as to store a charge in the antenna coil during an ON time, while supplying a boosted voltage based on a counter electromotive force generated in the antenna coil to the second capacitor so as to cause a second current to flow to the second capacitor from the antenna coil during an OFF time.

14. (Currently amended) The electronic circuit for a contactless tag according to claim 11, wherein the ~~circuit changeover switch has a~~ first connection terminal for the resonance circuit and a the second connection terminal for the booster

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circuit, ~~which~~ are sequentially connected to the antenna coil according to a circuit changeover control signal, and

the electronic circuit further comprises:

a rectification circuit that rectifies the electromotive force via the first connection terminal to generate a rectified voltage;

first and second capacitors connected in parallel to the rectification circuit for storing the rectified voltage;

a battery connected in parallel to the rectification circuit;

a control circuit that generates the circuit changeover control signal and a switching driving signal based on the rectified voltage; and

a charge pump that is turned on and off according to the switching driving signal when the booster circuit is formed according to the circuit changeover control signal, and that causes a first current that is conducted through the antenna coil from the battery to flow so as to store a charge in the antenna coil during an ON time, while supplying a boosted voltage based on a counter electromotive force generated in the antenna coil to the second capacitor so as to cause a second current to flow to the second capacitor from the antenna coil during an OFF time.

15. (Original) The electronic circuit for a contactless tag according to claim 13, further comprising a detector that detects the rectified voltage, wherein the battery is connected to the second connection terminal via the control circuit according to the detected rectified voltage.

16. (Original) The electronic circuit for a contactless tag according to claim 14, wherein the battery is chargeable, and the electronic circuit further comprises a detector that detects a voltage of the battery, wherein the circuit changeover control signal is generated based on the detected voltage of the battery.

17. (Original) The electronic circuit for a contactless tag according to claim 16, wherein the control circuit comprises:

an antenna changeover circuit that generates the circuit changeover control signal based on the rectified voltage or the voltage of the battery; and

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a field-effect transistor (FET) control circuit that generates a switching gate signal having a duty ratio corresponding to a predetermined ratio of an ON-OFF operation according to the circuit changeover control signal.

18. (Original) The electronic circuit for a contactless tag according to claim 11, wherein the transceiving device is brought into close proximity to a reader/writer for data communication.

19. (Original) The electronic circuit for a contactless tag according to claim 18, wherein the antenna coil resonates according to a power supplied from the reader/writer when it is brought into close proximity to the reader/writer.

20. (Currently amended) A method for manufacturing an electronic circuit system for a contactless tag, comprising:

bringing a transceiving device into close proximity to a reader/writer for data communication;

providing an antenna coil that resonates according to power supplied from the reader/writer when brought into close proximity with the reader/writer; and

switching between a state where the antenna coil forms a resonance circuit of the transceiving device and a state where the antenna coil forms a booster circuit,

wherein switching includes connecting the transceiving device to the resonance circuit and connecting the transceiving device to the booster circuit.